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AF/1763

Our Docket No.: 0325.00324

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Kenneth G. Flugaur et al.

Application No.: 09/460,638

Examiner: Zervigon, R.

Filed: December 14, 1999

Art Group: 1763

For: CHANNEL SLEEVE, IMPROVED PLASMA PROCESSING CHAMBER
CONTAINING CHANNEL SLEEVE AND METHODS OF MAKING AND
USING THE SAME

CERTIFICATE OF MAILING

I hereby certify that this letter, the response or amendment attached hereto are being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on November 4, 2004.

By: Jan M. Dunbar
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REPLY BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellants submit the following Reply Brief pursuant to 37 C.F.R. §41.41 for consideration
by the Board of Patent Appeals and Interferences.

Docket Number: 0325.00324
Application No.: 09/460,638

ARGUMENTS IN RESPONSE TO EXAMINER'S ANSWER

Grouping of the Claims

The claim groupings are distinguishable based on arguments unique to each group. Whether any given group's unique argument stands or falls will not necessarily cause any other group to stand or fall. Therefore, the Examiner's assertion that the groups merely point out difference is the claims¹ is incorrect.

Examiner's Response

Regarding group 1, the Examiner asserts that Foster teaches "item 271 as shown in Figure 2B, and having 'dimensions', act to, along with other components of Foster, in preventing plasma arcing to one of Foster's electrically conductive surface (222; Figure 2B)."² The text of Foster cited by the Examiner (reproduced in the Response After File of February 6, 2004) reads:

Accordingly, the RF showerhead/electrode 222 has also been modified. Showerhead/electrode 222 includes a stem 252 without a flange. Instead, a slight ridge 266 is formed around stem 252, and as shown in FIG. 2A, ridge 266 supports a generally circular ceramic tray 268 which is formed from a ceramic material, such as alumina (99.7% Al₂O₃), similar to the ceramic isolator sleeves 154, 156 shown in FIG. 2A. **Ceramic tray 268 is supported by ridge 266, and in turn, supports isolator sleeves 270, 271. Isolator sleeves 270, 271 are also preferably made of a ceramic insulator material similar to that used for sleeves 154, 156 of FIG. 2A.** As with the embodiments used to practice the present invention which are discussed above, preferably the holes of showerhead/electrode 22 are approximately 1/32 (0.0313) inches in diameter *to prevent the formation of a plasma inside cylinder 238* and to confine the plasma generally below the showerhead/electrode

¹ Examiner's Answer, Sept. 9, 2004, page 2, item 7.

² Examiner's Answer, Sept. 9, 2004, page 3, item 11, lines 5-7.

222 and above the susceptor 230. The embodiment of FIG. 2B utilizes quartz cylinder 238 and eliminates the metal attachment screws proximate showerhead/electrode 222 which helps to prevent the formation of a plasma within cylinder 238 and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal. A layer of insulation 272 may be placed atop gas distributor cover 239 to prevent contact by an operator, because the gas distributor cover 239 becomes very hot during operation. (Emphasis added)³

Isolator sleeve 271 is only mentioned in two sentences (highlighted in bold) in the above paragraph and neither sentence speaks of the isolator sleeve 271 preventing or inhibiting plasma arching. Therefore, the Examiner's plasma arcing prevention assertion does not appear to be supported by the cited text of Foster.

The Examiner further asserts that the isolator sleeve 271 of Foster prevents "arching between one of Foster's electrically conductive surfaces (222; Figure 2B) from Foster's RF feed line (256; Figure 2B)."⁴ In contrast, Figure 2B of Foster shows that the RF feed line 256 is in **direct electrical connection** to the electrode 222. The Examiner offers no text from Foster nor a convincing line of reasoning why the isolator sleeve 271 prevents arching between two metal elements already shorted together. Therefore, the Examiner's assertion appears to be merely a conclusory statement.

The Examiner maintains that (i) "within the cylinder 238" of Foster is similar to the claimed aperture through a wall of a plasma processing chamber and (ii) a surface of an electrode 222 of Foster is similar to the claimed surface of the aperture through the wall.⁵ If the electrode 222 of Foster forms a surface "within cylinder 238", then the body of the electrode 222 would be part of the

³ Foster, column 18, lines 33-58.

⁴ Examiner's Answer, Sept. 9, 2004, page 4, lines 16-18.

⁵ Examiner's Answer, Sept. 9, 2004, page 4, second to last line - page 5, line 5.

wall of the plasma processing chamber in order to track the claim language. However, the region “within cylinder 238” is not **through** the electrode 222 (wall) of the plasma processing chamber. Therefore, the Examiner still has not established that Foster teaches or suggests the claim limitations.

The Examiner offers no explanation why one of ordinary skill in the art would use the design of a gas nozzle 302 from Ishikawa to modify an isolator sleeve 172 from Foster. Instead, the Examiner appears to be improperly using the claim language as a template to pick and choose elements from the references to replicate the claims. Therefore, the Examiner has failed to establish motivation to add a flange to the isolator sleeve 271 of Foster.

Furthermore, FIG. 5 of Ishikawa does not appear to teach a flange of the gas nozzle 302 outside a wall of a plasma processing chamber, as presently claimed. In particular, the flange section of the gas nozzle 302 resides within the wall 314 when the gas nozzle 302 is installed. The Examiner’s argument that the flange of the gas nozzle 302 are outside an “outer surface” of the wall 314⁶ is irrelevant since the claim language is not directed to a surface of the wall.

In summary, the Examiner makes several assertions that are not supported by either the text of the references or a convincing line of reasoning. The Examiner also makes at least one argument against language not found in the group 1 claims. As such, the Examiner’s group 1 assertions should be disregarded.

Regarding group 2, the Examiner’s assertion that Foster teaches transmitting an RF signal “through the device...and conduit 256... out from the chamber...and arrives at showerhead/electrode

⁶ Examiner’s Answer, Sept. 9, 2004, page 7, lines 1-3.

222...that resides outside of Foster's aperture"⁷ is incorrect. First, Foster is silent regarding a source of the RF energy residing inside the chamber that could produce the alleged RF signal being transmitted out of the chamber. Second, FIG. 2B of Foster clearly shows the electrode 222 is inside the chamber, not outside as asserted by the Examiner. Furthermore, the Examiner contradicts his earlier assertion that the surface of the electrode 222 is similar to the claimed conductive surface of an aperture through a wall of the processing chamber, thus making the electrode 222 part of the chamber wall, not an element outside the chamber. As such, the Examiner's group 2 assertions do not appear to agree with FIG. 2B of Foster and should be disregarded.

Regarding group 4, the Examiner asserts that "RF power conducted through item 58 to the electrode 52 would generate plasma within the space of aperture 50 thereby 'cleaning', by etching, Foster's device."⁸ The Examiner gives support for his assertion as column 18, lines 33-59 of Foster, already reproduced above. In contrast, the cited text of Foster does not mention the sleeve 58. Even if the sleeve 58 in FIG. 2 of Foster is similar to the isolator sleeve 271 in FIG. 2A of Foster, the cited text of Foster (shown in italics) states that there is no plasma formed inside the cylinder 238 around the sleeve 271. Therefore, the cleaning assertion made by the Examiner contradicts the text of Foster and should be disregarded.

Regarding group 5, the Examiner asserts that "by lengthening Foster's device (item 58; Figure 2; col. 18 lines 33-59; items 270-272 and conduit 256; Figure 2B; column 18, lines 33-59)

⁷ Examiner's Answer, Sept. 9, 2004, page 8, lines 5-8.

⁸ Examiner's Answer, Sept. 9, 2004, page 8, lines 18-20.

and Foster's electrode (222; Figure 2B) the angle between these surfaces becomes 'non-orthogonal'."⁹ However, the Examiner's assertion appears to be a conclusory statement. No convincing line of reasoning is supplied why an angle between two surfaces is dependent upon a length of one of the surfaces. Based on FIG. 2B of Foster, it would appear that the isolator sleeve 271 and the electrode 222 would still be orthogonal if the isolator sleeve 271 were one inch in length, two inches in length or even three inches in length. Therefore, the Examiner still has not provided a reason why one of ordinary skill in the art would make an end of the isolator sleeve 271 of Foster non-orthogonal. As such, the Examiner's group 5 assertions should be disregarded.

Regarding group 6, the Examiner appears to be arguing language not found in the claims. In particular, the Examiner cites text of Foster for "increasing the etching time that is necessary to remove excess titanium."¹⁰ In contrast, the claim language is for generating a plasma for a predetermined period of time. A variable period would not appear to teach or suggest a predetermined period of time to one of ordinary skill in the art. As such, the Examiner has failed to establish that Foster teaches or suggest a predetermined period as claimed.

Regarding group 8, FIG. 2B of Foster shows that the isolator sleeve 271 does not contact a surface of cylinder 238 (asserted by the Examiner as defining the claimed aperture.) Therefore, the Examiner's argument that the isolator sleeve 271 can somehow exert a predetermined amount of pressure against the surface of cylinder 238 appears to be merely a conclusory statement.

⁹ Examiner's Answer, Sept. 9, 2004, page 9, lines 9-11.

¹⁰ Examiner's Answer, Sept. 9, 2004, page 10, lines 6-7 quoting Foster column 3, lines 1-7.

Furthermore, the Examiner's arguments regarding screws and fastening means for applying pressure are irrelevant due to the "one-piece outer portion consisting of an electrically insulative material" claim limitation. As such, the Examiner's group 8 assertions should be disregarded.

Regarding group 9, if the isolator sleeve 271 of Foster were **replaced** by a light pipe of Curtis, as suggested by the Examiner,¹¹ then the resulting structure would still appear to change the principle of operation of isolating the RF line 256 of Foster and/or would not have a reasonable expectation of success. In particular, if the light pipe of Curtis were disposed around the RF line 256 of Foster to provide isolation, then the electrode 222 of Foster would appear to prevent the light pipe from viewing the plasma. If the light pipe was extended all of the way through the electrode 222, then the electrode 222 would be isolated from the RF line 256 thus preventing proper plasma generation. If the light pipe were disposed inside the RF line 256, then the light pipe would not provide isolation for the RF line 256 as done by the isolator sleeve 271. As such, the proposed modification does not appear to be proper.

Furthermore, the Examiner's assertion, "Having both signals present during processing as suggested by Curtis does result in the claim language depending on the claim"¹² appears to be a conclusory statement. The Examiner offers no evidence from the references nor a convincing line of reasoning to support his assertion. Therefore, the Examiner has failed to establish a proposed

¹¹ Examiner's Answer, Sept. 9, 2004, page 12, lines 9-11.

¹² Examiner's Answer, Sept. 9, 2004, page 13, lines 8-9.

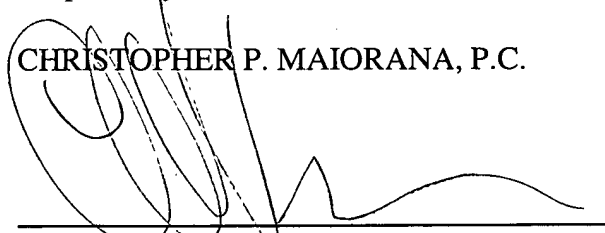
combination/modification of the references that teaches all of the claim limitations. As such, the Examiner's group 9 assertions should be disregarded.

CONCLUSION

The assertions that Foster and Ishikawa teach or suggest all of the claim limitations does not appear to be supported by the text of Foster and/or Ishikawa. The proposed combination and/or modification of Foster, Ishikawa and Curtis either (i) changes a principle of operation taught by Foster or (ii) lacks a reasonable expectation of success. Therefore, the Examiner has failed to establish *prima facie* obviousness. Furthermore, the Board is respectfully requested to carefully consider the Examiner's assertions against the true claim language and the actual text of the references.

Respectfully submitted,

CHRISTOPHER P. MAIORANA, P.C.

A handwritten signature in black ink, appearing to read 'Christopher P. Maiorana', is written over a horizontal line.

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Dated: November 4, 2004

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